

**PROTECTING TRUCK AGAINST FROST.**

By E. W. GRUSS, Houston Heights, Tex.

How to protect his crops against loss by frost is the problem that confronts the commercial trucker each year anew. To the trucker with sufficient capital the solution of this question need not present any difficulties, since he has but to determine upon the system of protection to be installed and then proceed to execute his plans. Not so with the grower of limited means, and the majority of truckers belong to this class. As their plants are generally undercapitalized, they are confronted by a serious problem when the question of protecting against frost arises.

The truckers as a rule are a hard-working people, in fact, more so than those engaged in general farming, and the returns which they realize for the products of their labor are so uncertain and depend upon so many conditions that they are loth to assume obligations which they may not be able to meet. So long as the weather remains mild the prospects are good; but if a frost should occur the crops may be heavily damaged or even totally destroyed. Such losses will be heavy in the aggregate unless the crops are protected.

In the April Review the time for marketing the winter crops of the Gulf coast country was given from December 1 to May 1. By including the spring vegetables, such as onions, potatoes, cabbage, tomatoes, cucumbers, melons, beans, and a few other varieties of minor importance, the marketing time would probably have to be extended to August 1. The earlier the spring crops can be marketed the better will be the financial returns. These crops, however, are so tender that a cold wind may often do as much damage as a frost. It is therefore necessary to protect the spring crops as well as the winter crops. The methods of frost protection were discussed in the April Review. Nothing can be added unless it be the hope that meteorologists may discover hitherto unknown laws or rules that would enable them to give still more timely warning than they now do. This would be of great benefit to the truckers of limited means, inasmuch as it would give them more time to protect their crops in their own primitive way.

*What to protect.*—The commercial truck crops which are grown in the open in south Texas during the winter months are: (1) Onions, cabbage, and strawberries; and (2) cauliflower, lettuce, beets, spinach, turnips, radishes, and carrots. The first group represents the money crops, on account of the large acreage devoted to them and of their great commercial value. The second group, although equally valuable commercially, is of less importance because their acreage is considerably smaller and they do not move in solid carload lots like the former. In point of susceptibility to cold the crops under group one rank inversely in the order given, while those of group two rank in the order given, except spinach, which is the hardiest of these crops.

On account of its great commercial value the strawberry should have the most careful attention, not only as regards cultural methods, but also as regards watchfulness and the readiness of means for protecting against frost. Cauliflower is more sensitive to cold than the strawberry and requires protection when onions and cabbage are out of danger. Lettuce will lose much of its value by frost burns, which render it unsightly and requires close trimming. It is a well-known fact that if a heavy frost affects lettuce or cabbage during the heading period, or even when that process is almost completed, the heads will

loosen up and never grow solid again. This renders these crops practically valueless, as no buyer will care to make an offer for the same. Beets will not suffer much from frost unless they are very young or the cold is intense. If the roots have not been injured, they will make a new growth of tops. Radishes and turnips are not so cold resistant as is commonly believed. They may not be killed outright by a heavy frost, but the effect is almost as bad as total destruction, because in either case they will become soft, spongy, or hollow, and commercially valueless. Spinach, carrots, and onions, except the Bermuda varieties, are more cold resistant than any of the other truck crops; but even they will be destroyed by such freezes as occurred in January and February, 1911.

Tomatoes and potatoes are the most remunerative spring crops. The former must be kept in cold frames until the danger of frost has passed. This plan will require extensive cold frames, but as the plants are confined to a limited space they can be protected much easier than if they were in the field. The same applies to peppers and eggplants. Potatoes are more easily cared for than any other spring crop. Sprouting may be delayed by storing them in a cool dry place, and planting should be so timed that the sprouts will not appear above ground until after the danger of severe frost is over. Three weeks usually elapse between the planting of potatoes and the appearance of the sprouts above ground.

Cucumbers and cantaloupes are two very remunerative crops if marketed early. The trucker who grows them for home consumption only may do so entirely in cold frames, but this is not practicable when they are grown for shipment. The demand for these products depends in a large measure upon the weather prevailing in the section to which they are to be shipped. It is therefore advisable to so time the planting of these crops that they will be ready for market at the proper season.

*When to protect.*—Crops generally, and truck crops especially, will be in the best condition when they have had continuous growth. To this end they should have a fertile soil, and the weather should be sufficiently favorable to render available the inactive plant food in the soil, or an unusual quantity of quickly available plant food may be supplied in order to overcome the retarded nitrification caused by a lower temperature. As rapidly growing plants are necessarily very tender, it is evident that the utmost care must be taken to prevent a check in their growth and to be ready to protect them against frost during critical periods of their development.

Some inexperienced growers labor under the impression that protection should be provided continuously. But this is not advisable, as continuous protection causes the plants to become supersensitive and therefore less cold resisting. Cabbage, cauliflower, and lettuce should be closely watched from the time the heads begin to form until they are ready for cutting. Peas and strawberries are most susceptible to frost when they are in bloom and while maturing pods or berries. Turnips, beets, radishes, and carrots require the most attention during the first stages of their growth. If frost affects them when the roots have attained marketable size, the loss sustained is chiefly in those roots that are exposed to the cold. Spinach and onions are the most hardy crops. They will survive any frost of a medium degree of severity. Nothing short of a freeze will actually kill them. Freezes such as occurred in south Texas in January and February, 1911, will kill anything which is not protected.

*How to protect.*—The United States Government maintains a Weather Bureau for the benefit of agriculture.

The forecasts are published daily in the press and disseminated from distributing centers in every State of the Union by mail, telephone, and otherwise. Through the cooperation of telephone companies the Weather Bureau is able to send warnings of frosts and cold waves into the rural districts that can not be reached so quickly by any other means, and there is no reason why anyone should fail to receive and utilize the forecasts. The writer has been reliably informed that a cane grower in southwest Texas saved \$10,000 through the timely warning of a cold wave, by cutting and windrowing his cane. The expense to the farmer for telephonic connection is small, while the entire crop may be saved from destruction by the timely receipt of a single warning. Beyond requiring a certain number of subscribers to justify the expense of establishing a rural line, the telephone company makes no demands. Telephonic connection is essential in transmitting warnings to the rural districts, and no farmer should be without a telephone.

Concerning the methods employed in giving protection against frost, much depends upon the means at the command of the grower. The man financially well situated may make his choice between sheds, frames, overhead irrigation and flooding, orchard heaters, and other methods, but the grower of limited means must necessarily resort to a less expensive protection. The simplest and most inexpensive form of protection against frost is the covering of the plant with soil. This is accomplished by running a half shovel or small turning plow sufficiently close so that the upturned soil will just cover the plants. Only one furrow should be thrown on the plants, and they should not remain under this cover longer than necessary. When repeated coverings are made, the beds will become unreasonably high, and the work of uncovering should be performed with a hoe.

Covering plants with hay or straw requires more preliminary preparations. Inferior grades of hay or straw will answer the purpose, or pine needles may be used. The material should be kept distributed over the field so as to be near at hand when needed. As in the case of

soil, this covering must be removed after each frost to prevent the crop from being injured. Lettuce in the head, for instance, will begin to decay if the covering remains during warm days. Onions, potatoes, and a few other plants will grow through the covering, but they will be spindling and weak in stem.

Matting and similar material have been and are used with success for covering purposes. The cost of the material, the necessity of renewing it periodically, and its uselessness for any other purpose prevent this kind of covering from growing in favor. Any of the foregoing methods will be satisfactory on low-growing crops, but in the case of tall plants different methods must be applied. The following are those most commonly used:

Sheds, of which the sides and roof provide a half light, will have a slightly higher temperature than the open air, and by the use of a few smudge pots or fires the temperature may be maintained above the danger point. The cost of construction, however, limits their use to small areas.

Smudging is a method that even a poor man may use. Worthless hay, straw, pine needles, sawdust, wood sufficiently decayed to prevent its blazing, are materials that can be provided with little or no expense. It is my opinion that a smudge resulting from the burning of vegetable matter is preferable to that resulting from the burning of mineral fuel. Some experimenting will be necessary to determine whether or not smudging has any deteriorating effect upon the flavor of the vegetables.

Flooding will doubtless prevent the temperature from falling to the danger point, but the quantity of water required would not be favorable to the health of the plant. The installation of an overhead sprinkling plant would prove equally effective and be probably cheaper. This method was described in the April Review.

For spring crops the best method of protecting against frost is to plant in spent hotbeds or cold frames. Potatoes may be covered up or smudged, but the other spring crops should have absolute protection, because even a strong, raw wind will injure and, in many instances, kill them.